LERNANTHROPUS SCIAENAE, SP. NOV., A COPEPOD PARASITIC ON THE GILLS OF THE FISH *SCIAENA GLAUCA* FROM MADRAS.

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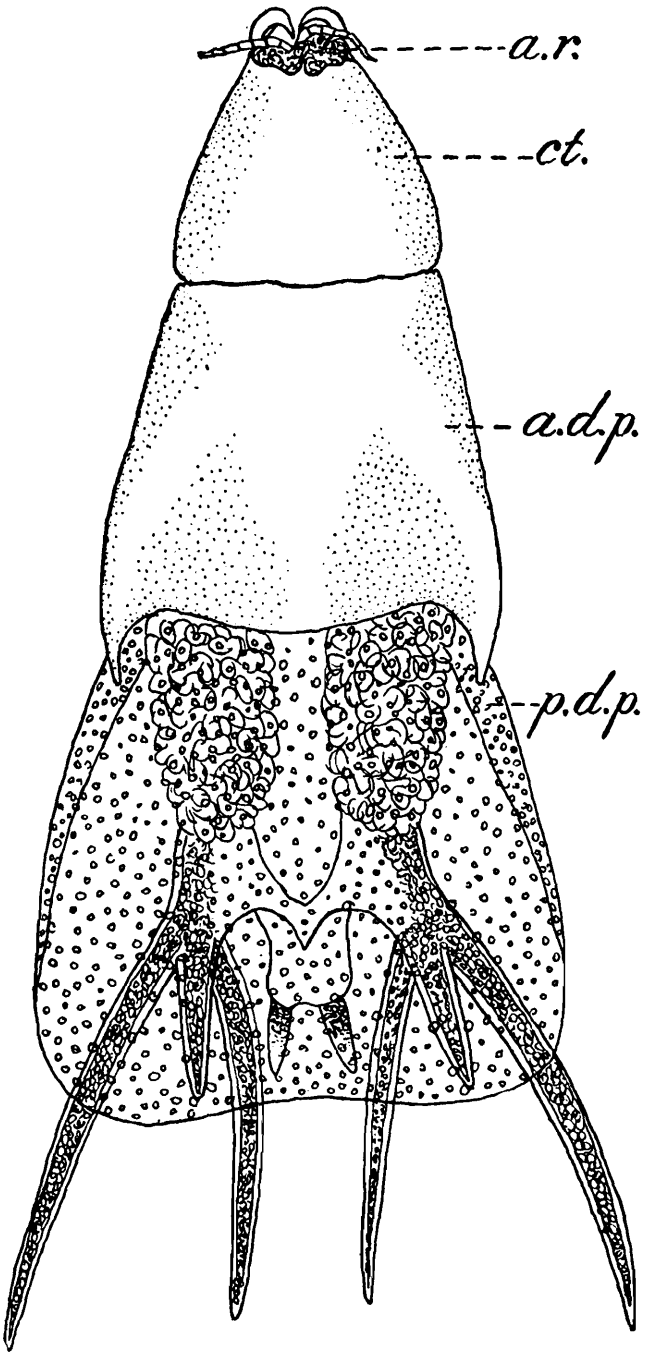
Introduction.—Of the few who have described Dichelesthid copepods parasitic on Indian fishes, Bassett Smith has recorded five species of the genus *Lernanthropus*; *L. giganteus* (Kroyer) on the gill of *Caranx* sp. from Indian Ocean, *L. trifoliatus* (Bassett Smith) on the gills of *Polynemus tetradactylus* from Bombay and *L. larvatus* (Heller) on the gills of the perch *Priacanthus ocellatus* from Indian ocean, *L. nudus* (Bassett Smith) on gills of *Mugil* sp. from Aden, and *L. atrox* (Heller) on gills of *Chrysophrys sarba* from the Persian Gulf. Kirtisinghe has recorded *L. cornutus* on gills of *Strongylura leiura* and *L. pristipomoidis* on the gills of *Pristipomides typus* from Ceylon. Thompson and Scott have mentioned two other genera in their account of Ceylon copepods. As American, British and European forms of Dichelesthidae have been exhaustively studied by Wilson, Scott and Brian respectively, a full description of the present form, a new species, was felt desirable.

Locality and Type specimen.—Three specimens of this Dichelesthid parasite were found (by Miss. A. G. Vijayalakshmi) attached to the gills of *Sciaena glauca* (a maigre of market value in Madras) when nearly a dozen of the fish caught in the shore nets were examined. The largest was 3·2 mm. long and of yellowish brown colour. As the other two were damaged, this has been deposited in the collections of the Zoological Survey of India, as the type specimen and is numbered $C2551/_1$.

Description.—The cephalothoracic shield is about 0·5 mm. long and 0·3 mm. broad being sub-quadrangular in form (Text-fig. 1). Anteriorly it does not cover the antennal region. The front edge is marked by a median accuminate process with a convex projection on each side. The lateral edges of the carapace are bent down ventrally, the anterior and posterior corners of these lateral flaps being rounded. The rest of the body is attached to this cephalothorax by a constriction 0·3 mm. wide and is covered dorsally by a large dorsal plate, which is divided by a transverse groove into a front and hind portion. The front dorsal plate is 0·8 mm. broad behind but narrower in front where it is folded ventrally to form large rounded lobes on either side behind the neck like constriction that marks the posterior limit of the cephalothorax. Posteriorly where the dorsal plate broadens, these lateral folds cease. The posterior corners are produced on either side into lobes which taper to a point and extend behind over the front corners of the second drosal plate covering the rest of the body (Text-fig. 1). Medially also the convex hind margin of the front plate extends over the anterior border of the hind plate. The hind plate is sub-quadrangular, like the cephalothoracic shield and is about 1·3 mm. long and 0·9 mm. broad behind

where it is broadest. The posterior corners are not only rounded but arch downwards slightly while the anterior corners are folded ventrally.



TEXT-FIG. 1.—*Lernanthropus sciaenae*, sp. nov., dorsal view : ×60.

a.r. antennal region ; *a.d.p.* anterior dorsal plate ; *c.t.* cephalothoracic shield ; *p.d.p.* posterior dorsal plate.

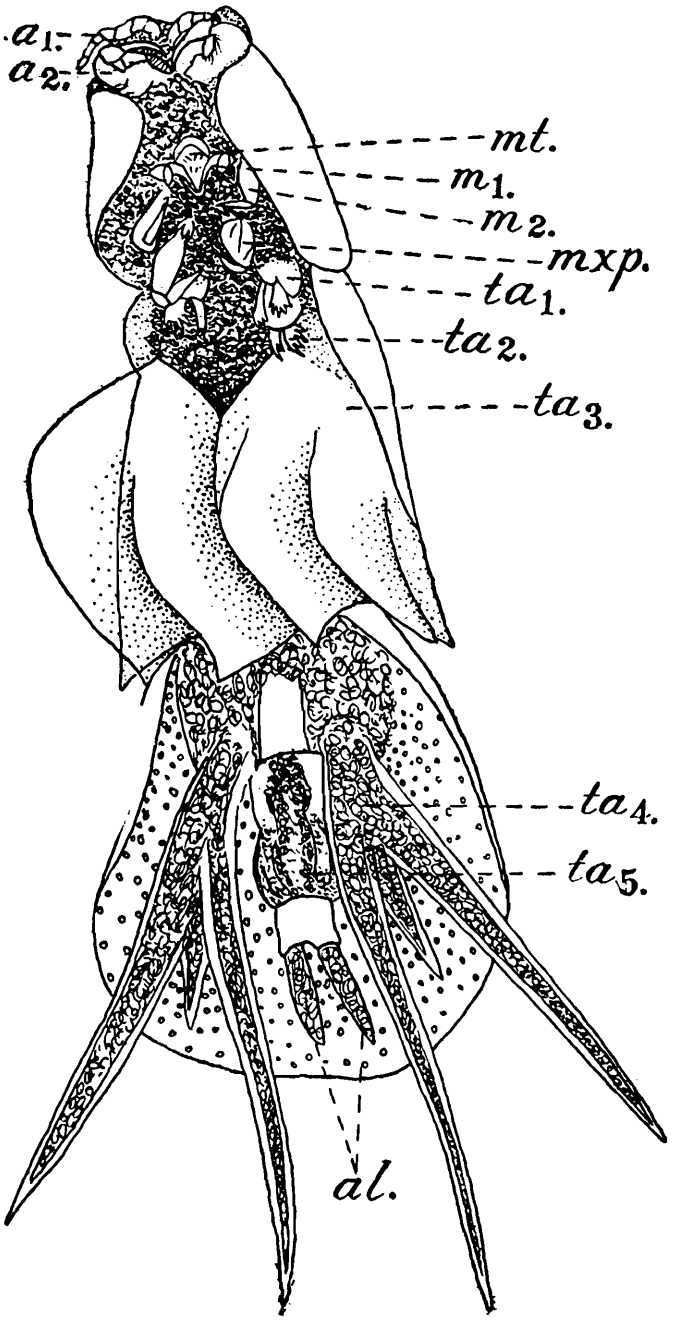
The hind margin is slightly concave medially. Four out of the six laminae of the fourth pair of legs project beyond the hind margin to a distance of about 0·9 mm. while the rest of their length, i.e. nearly 0·7 mm. can be seen through the transparent plate. The appendages are as in all Dichelesthids especially of the genus *Lernanthropus*. The first antenna is filiform and consists of seven short joints. The basal joints are setose while the distal ones bear spines. The appendage is concealed ventrally by the 2nd antenna and can be seen best from the dorsal side

as the cephalothoracic shield does not extend over the front part of head. 2nd antenna though seen dorsally for the same reason, can be better made out ventrally because of its uncinate character. It consists of a stout basal joint provided with a ridged plate at the base. The distal joint is a long stout claw close to the articulation of which the tip of the basal joint bears on its posterior inner aspect, a two jointed blunt projection.

The mandibles are found within the mouth tube. When viewed ventrally this tube appears triangular with its broad base lying on the anterior side and the apex pointing tailwards. This pointed end is formed by the tips of the two mandibles. Each mandible is styliform with a broadened flat tip, toothed on the inner or medial margin. Supporting the tips of the mandibles is a lower lip whose broad base lies above the endopod of the first maxilla. The first maxilla is well developed. The basal joint is stout and short. It bears a ventral scale-like appendage. The endopod consists of a long stout joint with a curved pointed tip which extends inward below the underlip and reaches very nearly the tips of the mandibles. At the base this joint bears an accessory plate having three processes. The exopod is directed outwards from the basal joint and consists of three joints of which the first is the largest, forming nearly three-fourths of the length of this ramus. It bears a short stout spine, the remaining two joints are short and form a spinous process. The 2nd maxilla is three jointed, uncinate. The basal joint is short and stout. It is not mentioned by Wilson and Scott in the species they have described. The second joint is large and swollen and has its distal margin on the outer side produced into a short spine. The third joint is long and slender. The extreme tip is formed by a small inwardly curved claw-like spine. No teeth were noticed on the inner aspect of the terminal joint such as are described by Wilson in the species he has studied.

The maxillipedes form a single pair as in the whole family. Each is four jointed. The short basal joint to whose inner aspect is applied a plate with three dentate lobes has not been mentioned by Wilson and Scott. The second joint is large and stout. The third joint is two-thirds as long but much thinner tapering to the outer end where it bears a small claw on the inner side of its distal margin. The fourth joint is a long stout spine. Thoracic legs are of four pairs. The first pair are biramous and two jointed. The basal joint is a flattened plate in a deep notch of which the two single jointed rami are inserted. The endopod is long and slender. It bears three terminal spines. The exopod is a shorter, broader, obovate plate with a dentate margin, there being five teeth. The second thoracic leg is of the same form, the rami being smaller. The third thoracic leg is modified into a broad foliaceous respiratory lamella. This lamella has a single broadly obtuse front end and two acute tips behind. Proceeding forwards from these two tips are two raised angular ridges with a deep groove between. This groove divides the lamella into two halves in such a way that a section across the lamella in the hind part would appear like "W" The groove between

the two halves (the exopod and the endopod) as well as the two ridges, so distinct behind, disappear about half-way up the lamella so that anteriorly the lamella is a smooth convex plate (Text-fig. 2). The two

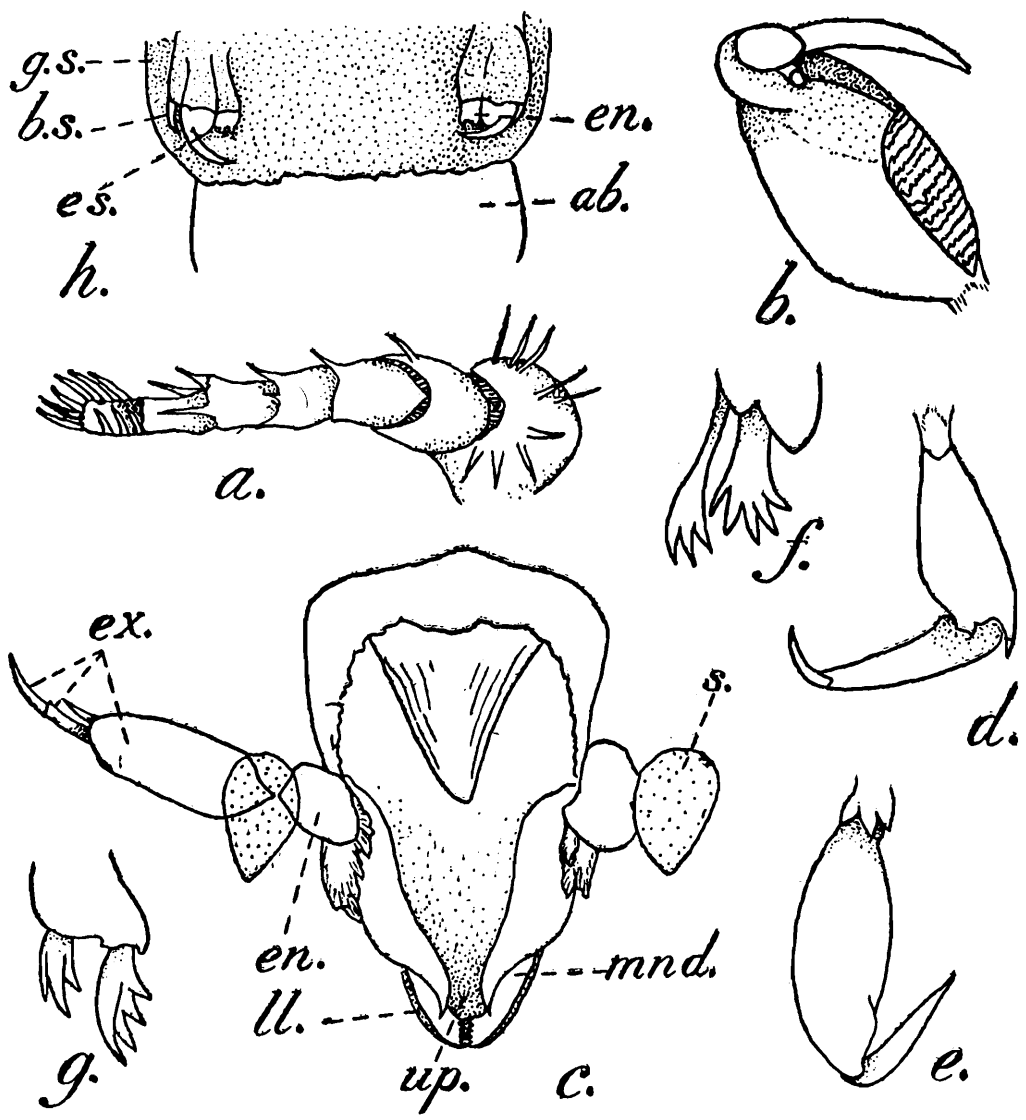


Text-fig. 2.—*Lernanthropus sciaenae*, sp. nov., ventral view: ×60.

al, anal laminae; *a1* & *a2*, 1st and 2nd antennae; *m1* & *m2*, 1st and 2nd maxillae; *mt*, mouth tube; *mxp*, maxillipede; *t.a.*, 1-5. five thoracic appendages.

posterior tips extend behind ventrally under the region of the body which is covered dorsally by the second dorsal plate. Medially the lamellae of the opposite sides overlap each other to a slight extent. Laterally, the hind part of the lamella on each side is united with the posterior wings of the first dorsal plate. The lamellae being broad and held oblique to the body, make the posterior part of the body of the parasite project away from the surface of the host to which the anterior part of the body, the cephalon, is firmly attached by means of the 2nd

antennae, 2nd maxillae, the maxillipedes as well as the lateral folds of the cephalothoracic shield and the first dorsal plate. The first two pairs of thoracic legs serve to waft water between the body and the obliquely held lamellae. By the posterior part of the body being so held at an angle to the host, the long respiratory processes of the 4th thoracic legs get washed by the water currents of the gill chamber of the fish host. The fourth thoracic leg is attached by a stout cylindrical part which distally divides into three long stout processes tapering accuminately to a point. Of the three lamellae, two, which are 1·6 mm. long, extend far behind the dorsal plate. These are probably the exopod and the endopod. The third which is more dorsally attached to the basal part, is probably just a process of the basipod. No articulation or chitinous processes are seen and the outer thin covering is of a hyaline appearance. The presence of three such laminae in the form described in this paper recalls a similar condition decribed in *L. trifoliatus* by Bassett Smith, though the rest of the characters of the two



TEXT-FIG. 3.—*Lernanthropus sciaenae*, sp. nov.

a. I antenna ; *b*. II antenna ; c. mouth tube, mandible and I maxilla *d*. II maxilla ; *e*. maxillipede ; *f*. I thoracicleg ; *g*. II thoracic leg ; *h*. V thoracic leg. *ab*. abdomen ; *bs*. basal spine ; *en*. endopod ; *es*. expod spine ; *ex*. exopod of I maxilla ; *g.s*. genital segment ; *ll*. lower lip ; *mnd*. mandible ; *s*. scale ; *up* upper lip.

species are different as can be seen from the table given below. This third lamina extends back nearly to the hind margin of the dorsal plate which hides them dorsally.

Behind the fourth thoracic legs, the genital segment extends to about 0·3 mm. Close to its posterior border there occur ventrally vestiges of a fifth pair of legs. Starting from the posterior edge of the last thoracic segment this appears as a columnar ridge-like prominence on each side of the ventral surface of the genital segment. This ends in a swollen papillose basal part bearing a claw like spine. This basipod bears two one-jointed rami, the outer ending in a long stout claw and the inner bearing a bidentate plate. The abdomen is single segmented. It is broader than long, the length being just a fourth of that of the genital segment. The anal plates are lanceolate and are shorter than the third laminae of the fourth thoracic legs and extend very nearly as far as the posterior margin of the dorsal plate.

Remarks.—Of the seven species of *Lernanthropus* so far recorded from the Indo-tropical region, some have not been so fully described as to permit a close and detailed comparison. Nevertheless a few notes on the females of each are given below, in addition to a full comparison with *L. trifoliatus* which the present species resembles most.

L. giganteus (Kroyer) *Female :* 9 mm. long ; was recorded from the Indian Ocean, found on the gills of *Caranx* sp. The dorsal plate consists of two parts, the anterior having conspicuous posterior processes and the posterior plate being as broad as the anterior but not covering nearly three-fourths of the fourth pair of legs.

L. larvatus (Heller) *Female :* 3 mm. long ; was recorded from the Indian Ocean, found on the gills of *Priacanthus ocellatus.* The dorsal plate is of one piece, obovate shaped, much smaller than the cephalothoracic plate. The third pair of legs cover the genital segment, abdomen and nearly the whole of the fourth pair of legs.

L. atrox (Heller) *Female :* 4 mm. long, recorded from the Persian Gulf, found on the gills of *Chrysophrys sarba.* Cephalothoracic shield covers the antennal segments. It is oblong with convex side. 1st antenna is seven-articled and the genital segment long. The second dorsal plate is orbicular and covers greater length of the laminae of the fourth pair of legs.

L. nudus (Bassett Smith) *Female :* 8 mm. long, was recorded from Aden, found on the gills of *Mugil* sp. The cephalothoracic shield covers the antennal segments with posterior margin invaginate at the centre and the anterior as well as lateral margin convex. The anterior and posterior dorsal plates lobed ; both together only as long as the cephalothoracic shield so that the genital segment, abdomen as well as nearly the whole length of the laminae are uncovered. The first antenna is six-jointed while the genital segment is long and constricted into two

L. cornutus (Kirtisinghe) *Female :* 5 mm. long ; was recorded from Ceylon, found on the gills of *Strongylura leiura.* Cephalothoracic shield

has a median rostral projection over the antennal region and lateral horns as well as ventral flaps. The anterior dorsal plate has a hump on its front margin and convex lateral sides. Posterior plate is broader at the hind and far longer covering nearly the whole length of the laminae of the 4th leg. First antennae are six jointed and the genital segment short.

L. pristipomidis (*Kirtisinghe*) *Female :* 4 mm. long ; was recorded from Ceylon found on the gills of *Pristipomides typus*. The antennal region is covered by a special lobe of the cephalothoraci plate which is rhomboidal in shape and has ventral flaps. The dorsal plate is single and does not cover the laminae of the fourth pair of legs. First antennae six jointed ; the first joint is bent outwards on itself. Genital segment is long.

The characters in which the new species differs from *L. trifoliatus* are shown in the following table :—

L. trifoliatus	*L. sciaenae*
Carapace : Covers the antennal segments	Does not cover the antennal segments.
First dorsal plate : Shape differs	Sub-quadrangular with anterior corners folded and posterior corners extended to pointed processes.
Second thoracic plate : Much shorter ; having nearly the entire laminae exposed	Much longer ; covers nearly half their length ; anyway covering the third lamina completely.
Head : Oblong	Sub-quadrangular.
1st antennae : Six jointed	Seven jointed.
Length : 8 mm.	3·2 mm.
Genital segment : Short	Long ; bears vestiges of 5th thoracic logs

The first maxillae, mandibles and the mouth tube have not been described for *L. trifoliatus*, so cannot be compared, as also the details of the structure of the 2nd maxillae and the maxillipede. Sex : though the egg strings are not formed, the specimen is a female because the carapace has folded lateral margins, the free thorax is covered by dorsal plate which is so long and large as to hide the abdomen from a dorsal view and also because of the presence of well developed third and fourth thoracic legs. The other two specimens collected were also females.

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